DETAILED ACTION

1. Applicant's election without traverse of claims 1, 2, 4-22, 24, 26, 27, and 29-31 in the reply filed on 6/16/2008 is acknowledged. Claims 3, 23, 25, 28 and 32-57 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 6/16/2008.

Information Disclosure Statement

2. The information disclosure statement filed on 11/07/2003 is in compliance with the provisions of 37 CFR 1.97, and has been considered and a copy is enclosed with this Office action.

Claim Rejections – 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 5 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not

described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 5 is directed towards an image sensing device with upper and lower wavelengths that are absorbed and transmitted by filters and photosensing elements; however, it is unclear how a lower wavelength "approximately between blue and green visible light" also contains the wavelength range of "approximately between green and red visible light," and likewise how an upper wavelength range of "approximately between green and red visible light" contains the wavelength range of "longer than red visible light," as stated in claim 5, dependent on the above underlined limitations of claim 4, rendering one of ordinary skill in the art unable to make or use the claimed invention.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 5 fails to further limit claim 4, a claim it's dependent on, by stating that the lower wavelength of claim 4 is "approximately between green and red visible light" and that the upper wavelength of claim 4 is "longer than red visible light," which does not further limit the limitations of claim 4 that state the lower wavelength is "approximately between blue and green visible light" and the upper wavelength is "between green and red visible light."

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. ***Claims 1, 4-7, 9-10 are rejected under 35 U.S.C. 102(e) as being anticipated by Merrill (US Patent 7,132,724) [hereafter Merrill] filed on 4/11/2003.***

9. As to claim 1, Merrill teaches a color-filter detector (Fig. 7) that comprises a substrate (62), photosensing regions (68, 78, 90) disposed at the surface of the substrate that capture incident light at wavelengths shorter than a predetermined upper wavelength and transmit light incident on the sensor that have wavelengths longer than the banding wavelength of the light captured at each particular sensing region, filter structures (66, 70, 76, 80, 88, 96) composed of p-type silicon layers are disposed over and surrounding the sensing regions that act as vertical containers for the sensing regions, containing the charges generated by the light of the desired wavelength range and keeping light of unwanted wavelengths from reaching the sensing regions by

absorbing incident light of shorter wavelengths and transmitting incident light of longer wavelengths, and a pinned-diode barrier gate (Fig. 14) used for reading-out charges generated by the vertical color-filter detector which is formed on the surface of the substrate (250) (Col. 5, 37-46, 62-67, Col. 6, 4-55, Col. 14, 16-29).

10. As to claim 4, Merrill teaches that blue light is absorbed closer to the surface of the detector, green light is absorbed deeper within the detector than blue light, and that red light travels deepest within the silicon layers of the detector. Therefore, the green detecting region (78), for capturing and holding light of green wavelengths, absorbs wavelengths shorter than an upper wavelength that is approximately between green and red visible light, and the filter container (76, 80) absorbs light at wavelengths shorter than a lower wavelength that is approximately between blue and green visible light (Fig. 7) (Col. 5, 19-24, 37-46, Col. 6, 23-33).

11. As to claim 5, Merrill teaches that blue light is absorbed closer to the surface of the detector, green light is absorbed deeper within the detector than blue light, and that red light travels deepest within the silicon layers of the detector. Therefore, the red detecting region (68), for capturing and holding light of red wavelengths, absorbs wavelengths shorter than an upper wavelength that is longer than red visible light, as wavelengths longer than red visible light will travel beyond the sensing region, and the filter container (66, 70) absorbs light at wavelengths shorter than a lower wavelength

that is approximately between green and red visible light (Fig. 7) (Col. 5, 19-24, 37-46, Col. 6, 15-22).

12. As to claim 6, Merrill teaches that the filter components of the detector are formed through masking and photolithography techniques (Fig. 8F, Col. 7, 18-48).

13. As to claim 7, Merrill teaches that the filter components surround the sensing regions vertically (70, 80, 96) and horizontally (66, 76, 88) to create a sealed container around the sensing region, enabling the blocking of non-normally incident light. Merrill also teaches that a light shield (104) is included to only allow light through an aperture (106) to reach the sensing elements, thereby also blocking non-normally incident light (Col. 6, 51-55).

14. As to claim 9, Merrill discloses all claimed subject matter with regard to the same comments as discussed with claim 1.

15. As to claim 10, Merrill discloses all claimed subject matter with regard to the same comments as discussed with claim 4.

Claim Rejections – 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

17. ***Claims 2, 8, 11-12, 14-15, 17-18, 20-22, 24, 26-27, 29-31 are rejected under 35 U.S.C 103 as being unpatentable over Merrill (US Patent 7,132,724) [hereafter Merrill] filed on 4/11/2003, as applied to claim 1 respectively, in view of Descure (US Patent 6,960,799) [hereafter Descure], filed on 7/27/1999.***

18. As to claim 2, Merrill fails to disclose that the filter is a polysilicon filter.

On the other hand, Descure teaches a color filter disposed over a photosensing region (Fig. 1A, 1), formed at and within a substrate (2), includes a polysilicon layer (5) (Col. 1, 20-29, Col. 2, 19-27).

It would have been obvious to one having ordinary skill in the art at the time of applicant's invention to include a filter comprising polysilicon as taught by Descure with the sensing device of Merrill because both prior art are directed towards color sensors disposed within substrates with color filters disposed above the sensing regions, and because polysilicon is well-known in the art as a material used in the composition of color filters for color sensing devices and could be used in the composition of the color-filter detector Merrill to yield predictable result of filtering wavelengths of light incident upon the detector due to the thickness of the polysilicon filter.

19. As to claim 8, Merrill teaches an integrated circuit (Fig. 15) to be used with an array of color-filter detectors (Fig. 17) and corresponding electrical circuitry (270-282). The color-filter detectors each comprise a substrate (62), photosensing regions (68, 78, 90) disposed at the surface of the substrate that capture incident light passed through filter sections at wavelengths within a predetermined wavelength range and transmit light at wavelengths greater than the predetermined wavelength range limit, filter structures (66, 70, 76, 80, 88, 96) that pass light onto the sensing regions and seal the sensing regions acting as containers for the charges generated by light falling within a specific wavelength range and keeping light of unwanted wavelengths from reaching the sensing regions by absorbing incident light of predetermined wavelengths and transmitting incident light with wavelengths longer than those being absorbed (Col. 5, 37-46, 62-67, Col. 6, 4-55, Col. 14, 45-67, Col. 16, 34-42).

It is however noted that Merrill fails to disclose that the filter disposed over the photosensing region is a polysilicon filter.

On the other hand, Descure teaches a color filter disposed over a photosensing region (Fig. 1A, 1), formed at and extending within a substrate (2), includes a polysilicon layer (5) (Col. 1, 20-29, Col. 2, 19-27).

It would have been obvious to one having ordinary skill in the art at the time of invention to include a filter comprising polysilicon as taught by Descure within the integrated circuit and pixel array of Merrill because both prior art are directed towards color sensors disposed within substrates with color filters disposed above the sensing regions, and because polysilicon is well-known in the art as a material used in the

composition of color filters for color sensing devices and could be used in the composition of the color-filter detectors within the integrated circuit of Merrill to yield predictable result of filtering wavelengths of light incident upon the detector due to the thickness of the polysilicon filter.

20. As to claim 11, Merrill teaches an image pixel array (Fig. 17) comprising rows and columns of color-filter detectors (Fig. 7) that each comprise a substrate (62), photosensing regions (68, 78, 90) disposed at the surface of the substrate that capture incident light passed through filter sections at wavelengths within a predetermined wavelength range and transmit light at wavelengths greater than the predetermined wavelength range limit, filter structures (66, 70, 76, 80, 88, 96) that pass light onto the sensing regions and seal the sensing regions acting as containers for the charges generated by light falling within a specific wavelength range and keeping light of unwanted wavelengths from reaching the sensing regions by absorbing incident light of predetermined wavelengths and transmitting incident light with wavelengths longer than those being absorbed (Col. 5, 37-46, 62-67, Col. 6, 4-55, Col. 14, 45-67, Col. 16, 34-42).

It is however noted that Merrill fails to disclose that the filter disposed over the photosensing region is a polysilicon filter.

On the other hand, Descure teaches a color filter disposed over a photosensing region (Fig. 1A, 1), formed at and extending within a substrate (2), includes a polysilicon layer (5) (Col. 1, 20-29, Col. 2, 19-27).

It would have been obvious to one having ordinary skill in the art at the time of invention to place a photosensor beneath the surface of a substrate with a polysilicon filter disposed upon it as taught by Descure with the pixel array of Merrill because both prior art are directed towards color sensors disposed within substrates with color filters disposed above the sensing regions, and because photosensors beneath substrates of color detecting devices with polysilicon filters are well-known in the art as locations where photosensors can be placed within color sensors and materials used in the composition of color filters for color sensing devices and could be substituted within the color detectors within the array of Merrill to yield predictable results of generating charges and filtering wavelengths of light incident upon the detector due to the thickness of the polysilicon filter and the respective photosensor.

21. As to claim 12, Descure discloses all claimed subject matter with regard to the same comments as discussed with claim 11.

22. As to claim 14, Merrill teaches that filter component (80) is formed to attenuate light of blue wavelengths while passing light of green and red wavelengths to sensing region (78) (Fig. 7, Col. 5, 37-46, Col. 6, 23-33).

23. As to claim 15, Merrill teaches that filter component (70) attenuates light with blue and green wavelengths, while passing light of red wavelengths to the sensing region (68) (Fig. 7, Col. 5, 37-46, Col. 6, 15-22).

24. As to claim 17, Merrill illustrates filter layers deposited over other filter layers (Figure 7, Elements 66, 70, 76, 80, and 88).

25. As to claim 18, Descure teaches a silicon nitride layer (6) is formed over the polysilicon layer (5) providing insulation (Col. 2, 24-27).

26. As to claim 20, Merrill teaches the pixel array may be fabricated to an arbitrary size, which includes about 1.3 megapixels to about 4 megapixels (Col. 16, 34-39).

27. As to claim 21, Merrill discloses all claimed subject matter with regard to the same comments as discussed with claim 7.

28. As to claim 22, Merrill teaches an image pixel array (Fig. 17) comprising rows and columns of the color-filter detectors (Fig. 7) that each comprise a substrate (62), photosensing regions (68, 78, and 90) disposed at the surface of the substrate, and container sections (66, 70, 76, 80, 88, 96) that pass light onto the sensing regions and seal the sensing regions acting as containers for the charges generated by light falling within a specific wavelength range and keeping light of unwanted wavelengths from reaching the sensing regions by absorbing incident light of predetermined wavelengths and transmitting incident light with wavelengths longer than those being absorbed. First container sections (76, 80), acting as a filter, are patterned and masked within a p-type

silicon layer (74) to enclose the first photosensing region (78) in the horizontal and vertical directions. Second container sections (66, 70) are patterned and masked within a p-type silicon layer (64) to enclose the second photosensing region (68) in the horizontal and vertical directions and are joined with container sections of the first photosensing region (76) above the second photosensing region (68). The imaging device also comprises a pinned-diode barrier gate (Fig. 14) used for reading-out charges generated by the vertical color-filter detector which is formed on the surface of the substrate (250)

The container elements (76, 80) surrounding the first photosensing region (78) absorb light shorter than the wavelength of green (less than 490nm) and transmit wavelengths of green or higher (greater than 490) to the first photosensing region. The first photosensing region absorbs a majority of green light (490-575nm) and transmits light with wavelengths longer than that of green (greater than 575nm). The second containers (66, 70) surrounding the second photosensing region (68) absorb light at wavelengths shorter than green light (490-575nm) and transmit light with wavelengths longer than that of green (greater than 575nm) to the second photosensing region (68). The second photosensing region receives light passing through the container sections and absorbs passed red light (575-700nm), which has longer wavelengths than green light. Light with a wavelength greater than 700nm travels deeper within the detector as its longer wavelength implies a deeper penetration of the light into the body of the detector before it is absorbed, thereby light greater than 700nm is transmitted through the second photosensing region (68). A third photosensor (90) is present within the

array of photodetectors to absorb blue light (400-490nm) while light of wavelengths greater than that of blue light are transmitted through the third photosensor (90) (Col. 5, 37-46, 62-67, Col. 6, 4-55, Col. 7, 18-48, Col. 14, 16-29, 45-60, Col. 16, 33-49, 63-67).

It is however noted that Merrill fails to disclose that the filter disposed over the photosensing region is a polysilicon filter.

On the other hand, Descure teaches a color filter disposed over a photosensing region (Fig. 1A, 1), formed at and extending within a substrate (2), includes a polysilicon layer (5) (Col. 1, 20-29, Col. 2, 19-27).

It would have been obvious to one having ordinary skill in the art at the time of invention to include depositing a polysilicon filter over a plurality of photosensing regions formed at a substrate's surface as taught by Descure with the pixel array comprising a plurality of color-filter detectors taught by Merrill because both prior art are directed towards color sensors disposed within substrates with color filters disposed above the sensing regions, and because polysilicon is well-known in the art as a material used in the composition of color filters for color sensing devices and could be used in the composition of the color-filter detectors within the pixel array of Merrill to yield predictable result of filtering wavelengths of light incident upon the detector due to the thickness of the polysilicon filter.

29. As to claim 24, Merrill teaches an imager system (Fig. 18) with an electronic system, or a processor, to accept and drive the electric signals from a coupled sensor chip (326), the sensor chip comprising an image pixel array (Fig. 17) comprising rows

and columns of color-filter detectors (Fig. 7) that each comprise a substrate (62), photosensing regions (68, 78, 90) disposed at the surface of the substrate that capture incident light passed through filter sections at wavelengths within a predetermined wavelength range and transmit light at wavelengths greater than the predetermined wavelength range limit, filter structures (66, 70, 76, 80, 88, 96) that pass light onto the sensing regions and seal the sensing regions acting as containers for the charges generated by light falling within a specific wavelength range and keeping light of unwanted wavelengths from reaching the sensing regions by absorbing incident light of predetermined wavelengths and transmitting incident light with wavelengths longer than those being absorbed (Col. 5, 37-46, 62-67, Col. 6, 4-55, Col. 14, 45-67, Col. 16, 34-42).

It is however noted that Merrill fails to disclose that the filter disposed over the photosensing region is a polysilicon filter.

On the other hand, Descure teaches a color filter disposed over a photosensing region (Fig. 1A, 1), formed at and extending within a substrate (2), includes a polysilicon layer (5) (Col. 1, 20-29, Col. 2, 19-27).

It would have been obvious to one having ordinary skill in the art at the time of invention to place a photosensor beneath the surface of a substrate that has a polysilicon filter disposed upon it as taught by Descure with the imager system of Merrill because both prior art are directed towards color sensors disposed within substrates with color filters disposed above the sensing regions, and because photosensors beneath substrates of color detecting devices with polysilicon filters are well-known in

the art as locations where photosensors can be placed within color sensors and materials used in the composition of color filters for color sensing devices and could be substituted within the color detectors within the imager system of Merrill to yield predictable results of generating charges and filtering wavelengths of light incident upon the detector due to the thickness of the polysilicon filter and the respective photosensor.

30. As to claim 26, Merrill teaches an integrated circuit (Fig. 15) to be used with an array of color-filter detectors (Fig. 17) and corresponding electrical circuitry (270-282). The color-filter detectors each comprise a substrate (62), photosensing regions (68, 78, 90) disposed at the surface of the substrate that capture incident light passed through filter sections at wavelengths within a predetermined wavelength range and transmit light at wavelengths greater than the predetermined wavelength range limit, filter structures (66, 70, 76, 80, 88, 96) that pass light onto the sensing regions and seal the sensing regions acting as containers for the charges generated by light falling within a specific wavelength range and keeping light of unwanted wavelengths from reaching the sensing regions by absorbing incident light of predetermined wavelengths and transmitting incident light with wavelengths longer than those being absorbed (Col. 5, 37-46, 62-67, Col. 6, 4-55, Col. 14, 45-67, Col. 16, 34-42).

It is however noted that Merrill fails to disclose that the filter disposed over the photosensing region is a crystal silicon filter.

On the other hand, Descure teaches a filter disposed over a photosensing region (Fig. 1A, 1), that starts at and extends beneath the surface of the substrate (2), that

comprises a polysilicon layer (5) disposed on top (Col. 1, 20-29, Col. 2, 19-27). Descure also teaches that in the field of optical radiation, crystal silicon and polysilicon have similar refraction coefficients and the thickness of the layered materials can be adjusted to filter a specific wavelength of light; therefore the polysilicon layer (5) can be replaced with a layer of crystal silicon, used as the substance of the substrate (2), and used as a color filter for the incident light impinging upon the photosensing regions (Col. 2, 23-33).

It would have been obvious to one having ordinary skill in the art at the time of invention to include a filter comprising crystal silicon as taught by Descure with the color-filter detector of Merrill because both prior art are directed towards color sensors disposed within substrates with color filters disposed above the sensing regions, and because crystal silicon is well-known in the art as a material used in the composition of color detecting devices and as a material with properties similar to those of polysilicon, a material which is used within color filters, and could be substituted within the color detectors of the integrated circuit of Merrill to yield the predictable result of filtering wavelengths of light incident upon the detector due to the thickness of the crystal silicon layer over a photosensor.

31. As to claim 27, Merrill teaches an image pixel array (Fig. 17) comprising rows and columns of color-filter detectors (Fig. 7) that each comprise a substrate (62), photosensing regions (68, 78, 90) disposed at the surface of the substrate that capture incident light passed through filter sections at wavelengths within a predetermined

wavelength range and transmit light at wavelengths greater than the predetermined wavelength range limit, filter structures (66, 70, 76, 80, 88, 96) that pass light onto the sensing regions and seal the sensing regions acting as containers for the charges generated by light falling within a specific wavelength range and keeping light of unwanted wavelengths from reaching the sensing regions by absorbing incident light of predetermined wavelengths and transmitting incident light with wavelengths longer than those being absorbed (Col. 5, 37-46, 62-67, Col. 6, 4-55, Col. 14, 45-67, Col. 16, 34-42).

It is however noted that Merrill fails to disclose that the filter disposed over the photosensing region is a crystal silicon filter.

On the other hand, Descure teaches a filter disposed over a photosensing region (Fig. 1A, 1), that starts at the extends beneath the surface of the substrate (2), that comprises a polysilicon layer (5) disposed on top (Col. 1, 20-29, Col. 2, 19-27). Descure also teaches that in the field of optical radiation, crystal silicon and polysilicon have similar refraction coefficients and the thickness of the layered materials can be adjusted to filter a specific wavelength of light; therefore the polysilicon layer (5) can be replaced with a layer of crystal silicon, used as the substance of the substrate (2), and used as a color filter for the incident light impinging upon the photosensing regions (Col. 2, 23-33).

It would have been obvious to one having ordinary skill in the art at the time of invention to include a filter comprising crystal silicon as taught by Descure with the color-filter detector of Merrill because both prior art are directed towards color sensors

disposed within substrates with color filters disposed above the sensing regions, and because crystal silicon is well-known in the art as a material used in the composition of color detecting devices and as a material with properties similar to those of polysilicon, a material which is used within color filters, and could be substituted within the color detector components of the pixel array of Merrill to yield the predictable result of filtering wavelengths of light incident upon the detector due to the thickness of the crystal silicon layer over a photosensor.

32. As to claim 29, Merrill teaches an imager system (Fig. 18) with an electronic system, or a processor, to accept and drive the electric signals from a coupled sensor chip (326), the sensor chip comprising an image pixel array (Fig. 17) comprising rows and columns of color-filter detectors (Fig. 7) that each comprise a substrate (62), photosensing regions (68, 78, 90) disposed at the surface of the substrate that capture incident light passed through filter sections at wavelengths within a predetermined wavelength range and transmit light at wavelengths greater than the predetermined wavelength range limit, filter structures (66, 70, 76, 80, 88, 96) that pass light onto the sensing regions and seal the sensing regions acting as containers for the charges generated by light falling within a specific wavelength range and keeping light of unwanted wavelengths from reaching the sensing regions by absorbing incident light of predetermined wavelengths and transmitting incident light with wavelengths longer than those being absorbed (Col. 5, 37-46, 62-67, Col. 6, 4-55, Col. 14, 45-67, Col. 16, 34-42).

It is however noted that Merrill fails to disclose that the filter disposed over the photosensing region is a crystal silicon filter.

On the other hand, Descure teaches a filter disposed over a photosensing region (Fig. 1A, 1), that starts at and extends beneath the surface of the substrate (2), that comprises a polysilicon layer (5) disposed on top (Col. 1, 20-29, Col. 2, 19-27). Descure also teaches that in the field of optical radiation, crystal silicon and polysilicon have similar refraction coefficients and the thickness of the layered materials can be adjusted to filter a specific wavelength of light; therefore the polysilicon layer (5) can be replaced with a layer of crystal silicon, used as the substance of the substrate (2), and used as a color filter for the incident light impinging upon the photosensing regions (Col. 2, 23-33).

It would have been obvious to one having ordinary skill in the art at the time of invention to include a filter comprising crystal silicon as taught by Descure with the color-filter detector of Merrill because both prior art are directed towards color sensors disposed within substrates with color filters disposed above the sensing regions, and because crystal silicon is well-known in the art as a material used in the composition of color detecting devices and as a material with properties similar to those of polysilicon, a material which is used within color filters, and could be substituted within the color detector components of the imager system of Merrill to yield the predictable result of filtering wavelengths of light incident upon the detector due to the thickness of the crystal silicon layer over a photosensor.

33. As to claim 30, Merrill teaches an imager integrated circuit (Fig. 15) to be used with an array of color-filter detectors (Fig. 17) and the corresponding circuitry (270-282). The color-filter detectors each comprise a substrate (62), photosensing regions (68, 78, 90) disposed at the surface of the substrate that capture incident light at wavelengths shorter than an upper wavelength and transmit light incident on the sensor that have wavelengths longer than the banding wavelength of the light captured at each particular sensing region, filter structures (66, 70, 76, 80, 88, 96) that are disposed over and surrounding the sensing regions act as vertical containers for the sensing regions, containing the charges generated by the light of the desired wavelength range and keeping light of unwanted wavelengths from reaching the sensing regions by absorbing incident light of shorter wavelengths and transmitting incident light of longer wavelengths, and a pinned-diode barrier gate (Fig. 14) used for reading-out charges generated by the color-filter detector which is formed on the surface of the substrate (250).

The container elements (76, 80) surrounding the first photosensing region (78) absorb light shorter than the wavelength of green (less than 490nm) and transmits wavelengths of green or higher (greater than 490) to the first photosensing region. The first photosensing region absorbs a majority of green light (490-575nm) and transmits light with wavelengths longer than that of green (greater than 575nm). The second containers (66, 70) surrounding the second photosensing region (68) absorb light at wavelengths shorter than green light (490-575nm) and transmit light with wavelengths longer than that of green (greater than 575nm) to the second photosensing region (68).

The second photosensing region receives light passing through the container sections and absorbs red light (575-700nm), which has longer wavelengths than green light. Light with a wavelength greater than 700nm would be able to travel deeper within the detector as the longer wavelength implies the deeper the light will penetrate the body of the detector before it is absorbed, therefore light greater than 700nm would be transmitted through the second photosensing region (68) (Col. 5, 37-46, 62-67, Col. 6, 4-55, Col. 7, 18-48, Col. 14, 16-29, 45-67, Col. 16, 33-49, 63-67).

It is however noted that Merrill fails to disclose that the filter disposed over the photosensing region is a polysilicon filter.

On the other hand, Descure teaches a color filter disposed over a photosensing region (Fig. 1A, 1), formed at and extending within a substrate (2), includes a polysilicon layer (5) (Col. 1, 20-29, Col. 2, 19-27).

It would have been obvious to one having ordinary skill in the art at the time of invention to include depositing a polysilicon filter over a plurality of photosensing regions formed at a substrate's surface as taught by Descure with the pixel array comprising a plurality of color-filter detectors taught by Merrill because both prior art are directed towards color sensors disposed within substrates with color filters disposed above the sensing regions, and because polysilicon is well-known in the art as a material used in the composition of color filters for color sensing devices and could be used in the composition of the color-filter detectors within the integrated circuit of Merrill to yield predictable result of filtering wavelengths of light incident upon the detector due to the thickness of the polysilicon filter.

34. As to claim 31, Merrill teaches an imager integrated circuit (Fig. 15) to be used with an array of color-filter detectors (Fig. 17) and the corresponding circuitry (270-282). The color-filter detectors each comprise a substrate (62), sensing regions (68, 78, 90) disposed at the surface of the substrate that capture incident light at wavelengths shorter than an upper wavelength and transmit light incident on the sensor that have wavelengths longer than the banding wavelength of the light captured at each particular sensing region, filter structures (66, 70, 76, 80, 88, 96) that are disposed over and surrounding the sensing regions act as vertical containers for the sensing regions, containing the charges generated by the light of the desired wavelength range and keeping light of unwanted wavelengths from reaching the sensing regions by absorbing incident light of shorter wavelengths and transmitting incident light of longer wavelengths, and a pinned-diode barrier gate (Fig. 14) used for reading-out charges generated by the color-filter detector which is formed on the surface of the substrate (250).

The container elements (76, 80) surrounding the first photosensing region (78) absorb light shorter than the wavelength of green (less than 490nm) and transmits wavelengths of green or higher (greater than 490) to the first photosensing region. The first photosensing region absorbs a majority of green light (490-575nm) and transmits light with wavelengths longer than that of green (greater than 575nm). The second containers (66, 70) surrounding the second photosensing region (68) absorb light at wavelengths shorter than green light (490-575nm) and transmit light with wavelengths

longer than that of green (greater than 575nm) to the second photosensing region (68). The second photosensing region receives light passing through the container sections and absorbs red light (575-700nm), which has longer wavelengths than green light. Light with a wavelength greater than 700nm would be able to travel deeper within the detector as the longer wavelength implies the deeper the light will penetrate the body of the detector before it is absorbed, therefore light greater than 700nm would be transmitted through the second photosensing region (68) (Col. 5, 37-46, 62-67, Col. 6, 4-55, Col. 7, 18-48, Col. 14, 16-29, 45-67, Col. 16, 33-49, 63-67).

It is however noted that Merrill fails to disclose that the filters disposed over the photosensing regions are crystal silicon filters.

On the other hand, Descure teaches a filter disposed over a photosensing region (Fig. 1A, 1), that starts at and extends beneath the surface of the substrate (2), that comprises a polysilicon layer (5) disposed on top (Col. 1, 20-29, Col. 2, 19-27). Descure also teaches that in the field of optical radiation, crystal silicon and polysilicon have similar refraction coefficients and the thickness of the layered materials can be adjusted to filter a specific wavelength of light; therefore the polysilicon layer (5) can be replaced with a layer of crystal silicon, used as the substance of the substrate (2), and used as a color filter for the incident light impinging upon the photosensing regions (Col. 2, 23-33).

It would have been obvious to one having ordinary skill in the art at the time of invention to include a filter comprising crystal silicon as taught by Descure with the color-filter detector of Merrill because both prior art are directed towards color sensors

disposed within substrates with color filters disposed above the sensing regions, and because crystal silicon is well-known in the art as a material used in the composition of color detecting devices and as a material with properties similar to those of polysilicon, a material which is used within color filters, and could be substituted within the color detector components of the integrated circuit of Merrill to yield the predictable result of filtering wavelengths of light incident upon the detector due to the thickness of the crystal silicon layer over a photosensor.

35. ***Claims 13 and 19 are rejected under 35 U.S.C 103 as being unpatentable over Merrill (US Patent 7,132,724) [hereafter Merrill] filed on 4/11/2003 and Descure (US Patent 6,960,799) [hereafter Descure], filed on 7/27/1999, as applied to claims 12 and 18 respectively, in view of Rhodes (US Patent 6,815,743) [hereafter Rhodes] filed on 1/30/2003.***

36. As to claim 13, both Merrill and Descure teach the photosensors of the pixel array are photodiodes (Merrill, Col. 6, 39, Descure, Col. 2, 19-34).

It is however noted that Merrill and Descure fail to teach selecting the photosensor from a group consisting of a photodiode, photogate, photoconductor, or other image to charge converting device for initial accumulation of photo-generated charge.

On the other hand, Rhodes teaches a CMOS color detector (Fig. 12) in which the photosensitive elements (24a-24c) for each pixel cell (100a-100c) is a photogate, but

can also be a photodiode, a photoconductor, or other photosensitive elements to accumulate photogenerated charge (Col. 9, 54-61).

It would have been obvious to one having ordinary skill in the art at the time of invention to choose a photosensor from amongst a group consisting of a photodiode, photogate, photoconductor, or other image to charge converting device as taught by Rhodes with the pixel array of Merrill and Descure because all prior art are directed towards imagers that capture incident light and convert captured light to electrical signals and because groups consisting of those elements are well-known in the art and would allow the array of Merrill and Descure to continue to capture and convert incident light representing an image into photo-generated charges.

37. As to claim 19, Rhodes teaches an insulating cap layer (110a-110c) of silicon nitride where electrical contacts are formed (Col. 9, 54-67, Col. 10, 1-6).

38. ***Claim 16 is rejected under 35 U.S.C 103 as being unpatentable over Merrill (US Patent 7,132,724) [hereafter Merrill] filed on 4/11/2003 and Descure (US Patent 6,960,799) [hereafter Descure], filed on 7/27/1999, as applied to claim 11, in view of Randazzo (US Patent 6,093,585) [hereafter Randazzo] filed on 5/8/1998.***

39. As to claim 16, it is noted that both Merrill and Descure fail to teach a layer of tetraethyl orthosilicate is formed over the polysilicon layer.

On the other hand, Randazzo teaches a layer of dielectric material such as tetraethyl orthosilicate (TEOS) (Fig. 2C, 202) is formed over a layer of polysilicon (200) (Col. 1, 43-59).

It would have been obvious to one having ordinary skill in the art at the time of invention to including forming a layer of tetraethyl orthosilicate (TEOS) over a polysilicon layer as taught by Randazzo with the polysilicon filter within the pixel array of Merrill and Descure because al prior art are directed towards solid-state semiconductor fabrications of electrical circuits and because TEOS is a well-known dielectric coating substance that can be used as a cap layer upon a layer of polysilicon within a solid-state semiconductor device.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Osinski whose telephone number is (571) 270-3949. The examiner can normally be reached on Monday to Thursday 9 a.m. to 6 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ngoc Yen Vu can be reached on (571) 272-7320. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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07/28/2008

/Ngoc-Yen T. VU/
Supervisory Patent Examiner, Art Unit 2622